Appendix H

Engineering Specialist Report

Resource: Engineering

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Introduction:

The Little Canyon Mountain Project is a fuels reduction project on the Prineville District of the Bureau of Land Management. The project is located in Township 14 South, Range 31 East, Sections 12 and 13, and Township 14 South, Range 32 East, Sections 6, 7, and 18, approximately three and one half miles southeast of John Day, Oregon. The project is accessed from US Highway 395 by turning east on Marysville Road in the City of Canyon City and following it approximately 1.8 miles to County Road 77. Follow County Road 77 approximately 0.3 miles to the beginning of the project at the turnoff to Forest Service Trail 218. The project can also be accessed from US Highway 26 by turning south at MP 165 onto County Road 52. Follow County Road 52 south and west to County Road 77 and then south to the beginning of the project.

Existing Condition:

The main road into the project area, labeled 'BLM 1' on the map, is a one-lane road with turnouts. This road is used to access land under the jurisdiction of the Bureau of Land Management, Malheur National Forest, and private holdings. This road accesses the trailhead for the Canyon Mountain Trail on the Malheur National Forest. The road receives very little maintenance which can be attributed to both a lack of funds for road maintenance and the distance of this road from the district office. Because of the lack of maintenance the road surface is in very poor condition in many areas and is not suitable for haul at this time.

The first 0.3 miles of this road has a twelve foot wide Bituminous Surface Treatment (BST) that is in good condition except the last 400 feet which has pot holes. At the end of the BST the surface changes to native material. Between MP 0.3 and MP 0.7 there are several areas with deep rutting due to poor soils and inadequate drainage. From MP 0.7 to MP 1.2 the road is in the bottom of a draw and runs parallel to Little Pine Creek. Extensive use during times when the road is wet has resulted in areas of severe rutting. Because of inadequate drainage features water runs down the road from these areas of rutting and then into the creek resulting in sediment in the stream.

From MP 1.2 the road climbs up the ridge through a series of seven switchbacks to MP 2.6 which is in a saddle in the northwest quarter of Section 18. Most of this section of the road is twelve feet to fourteen feet wide. There are areas along this section of the road that has rutting due to use during times when the road is wet and the high clay content of the soils. The mud created by this rutting does have the potential to reach streams. In the area of many of the switchbacks there are Off-Highway Vehicle (OHV) and jeep trails that have been created by people cutting the corner and going straight down the hill.

At MP 2.6 the road turns west and northwest and climbs to its terminus in Section 12. This last section of road is only eight feet to ten feet wide and would need to be widened prior to extensive use as a haul route. All of the road past MP 0.3 has native material for a surface and is in very bad condition in many areas due to inadequate drainage and poor soils.

In addition to the main road there are many side roads that have been built to either access mining claims, harvest timber or fight fires. These roads have native surfacing and are in poor shape and have the potential to rut and contribute sediment to streams if they are left in the condition they are in now.

The only use for the roads in the project area in the foreseeable future is by recreational users and by miners accessing their claims. There may be slight increases in recreational use but if the main road continues to deteriorate that use will decrease because of the increased difficulty of driving the road. At this time there is no mining activity other than at the Great Northern Mine and no increase is indicated in the future. However, if there was an increased demand for chromite ore there could be a significant increase in the use of the road for hauling the ore. Prior to hauling the miner would be required to obtain a permit from the Bureau of Land Management. A permit from USDA – Forest Service would also be required if any Forest Service roads were used. The permit would require the miner to maintain the road to its current or better condition.

Environmental affects by alternative:

Alternative A – No Management Action:

If this alternative is selected the road system will suffer further degradation due to increased use, both recreational and commercial users, and little or no maintenance. Without maintenance the road will eventually become unusable to all but very high clearance vehicles or motorcycles.

Alternative B – BMBP Proposal:

This alternative will have the same negative effects on the road system that the selection of Alternative A would have.

Alternative C – Historic Conditions:

This alternative will have the same negative effects on the road system that the selection of Alternative A would have.

Alternative D – Uniform Treatment:

If this alternative is selected the following positive effects will occur in regards to the existing road system. The last 400' of the BST section of the road is adjacent to a private residence and the owner has requested that the road be moved further from the house if possible. By straightening out a curve at this location the road will be approximately 40' further from the house. There is also a culvert at this location which is not functioning and provisions for drainage will have to be included in the design. This new section of road would cross a small draw and the design will have to provide for drainage. Approximately 500 cubic yards of fill material will be needed to build the road up and 160 cubic yards of surface rock. Due to the small quantity this fill material and surface rock would need to come from a commercial source. There are several options for providing for drainage that can be looked at. They include: 1) Install an 18" x 28' culvert. 2) At the low point of the draw place large rock with little to no fines in it which will allow water to flow through it and then place the rest of the fill material on top. 3) Provide a low spot in the roadway that is level with the draw on the high side of the road and allow water to flow across the road. The cost estimate below includes option #1.

Before any management activities occur the native surfaced portion of the road will need to be scarified, bladed and shaped to remove the existing ruts and mud holes. At the same time additional drainage dips will need to be constructed to divert water off the road into areas where any sediment will have little opportunity to reach streams. Approximately eight additional drainage dips per mile will be needed. There may be areas where it would be desirable to excavate unsuitable material from the roadbed and backfill with select borrow material before placing the surface course. An alternative to removing this unsuitable material would be to place geotextile down prior to placing the surface course. After blading and shaping an eight to ten inch lift of pit-run or grid-rolled rock needs to be placed from MP 0.3 to MP 3.17. This will be approximately 5, 000 cubic yards of material.

Under this alternative the section of road from MP 0.7 to MP 1.24 will be relocated away from Little Pine Creek. This relocation will move the road to the location marked "RELOC" on the map. This route would be approximately 0.5 miles long. From its junction with the existing road the new route would cross the upper end of a small basin and then follow a draw for approximately 500 feet. The road would then cross a ridge with a thru-cut. Geotextile would need to be placed on the subsurface from where the road crosses the basin to where it crosses the ridge. After crossing three small dry draws the road would continue climbing up a ridge. It would connect with the existing road at MP 1.24 and would include two switchbacks and four 18 to 24 inch culverts. The first switchback is near an old log structure that has collapsed. If possible this structure needs to be protected. In the middle of the second switchback the road crosses a ditch formerly used to provide water to mining claims. A culvert will be needed at this location to allow water to continue flowing in this ditch. This route would need to have the same lift of

rock placed on it as is on the rest of the road.

The roads that access active mining claims will need to remain open. Some of the other roads will also need to remain open but many roads may be closed. The roads that need to be left open are labeled "KO" on the map and the roads that may be closed are labeled "C" on the map. All roads that are closed need to be bladed and shaped to remove ruts, have drainage dips and/or waterbars constructed, and seed and mulch applied at a rate 1.5 to 2 times the normal rate. The closures may be implemented by constructing "tank traps" and/or by spreading slash over the first one hundred to two hundred feet of the road.

Alternative E – Graded Treatment:

The selection of Alternative E will result in some improvement to the road system but on a more limited basis than Alternative D. The only difference between Alternative D and Alternative E is that the section of road from MP 0.7 to MP 1.24 will not be relocated away from Little Pine Creek. Instead the existing road would be scarified, bladed and shaped and additional drainage dips built. Geotextile would be placed on the road surface from MP 0.7 to MP 1.17 and a twelve-inch lift of pit-run or grid-rolled rock placed over the geotextile.

Alternative F – Stratified Treatment:

The selection of Alternative F will result in further degradation of the road system because there will be no road reconstruction, closures, or improvements. There will continue to be ruts and the mudholes will continue to get worse because of continued commercial and recreational use of the roads and limited maintenance on them.

Costs:

The following are estimated costs based on the USDA – Forest Service, Region 6 Cost Guide for Cost Guide Zone 3, Davis-Bacon Area 6, dated February 2002. This cost guide is in metric units and the costs have been adjusted to reflect English or imperial units.

Alternative D: Relocate road away from Little Pine Creek and recontour the portion of the existing road being decommissioned. Provide for additional drainage and support on the remainder of the existing road. Length of new road = approximately 0.5 miles which will replace 0.55 miles of existing road.

Relocate road away from house: Some clearing will be required as well as installing a culvert and placing fill material and crushed aggregate surfacing.

Clearing: Estimate 0.25 acres of light clearing with the tops and limbs and stumps piled and burned and the logs piled. The cost for this per acre will be:

$2,300/ac x 1 (light clearing) x [0.67 (tops & limbs) + 0.06 (logs) + 0.52

(stumps)] x 1.0 (average sideslope of 1 – 15%) x 1 (clearing width of 18 – 36') = $2,875/ac.

$2,875/ac x 0.25 acre = $720

Culvert: 18" x 28' CMP at $20/lf = 28 lf x $20/lf = $560

Fill material: 500 cubic yards of material at estimated cost of $12/cy.
500 cy x $12/cy = $6,000.

Surfacing: 160 cubic yards of crushed aggregate at estimated cost of $15/cy.
160 cy x $15/cy = $2,400

Total cost for moving road away from house = $9,680.

Clearing: There will be minimal clearing required. Estimate 3.25 acres of light clearing along the existing road with a basic cost of $2,300/acre. The tops and limbs and stumps will be piled and burned and the logs piled. The cost per acre will be:

$2,300 x 1 (light clearing) x [0.67 (tops & limbs) + 0.06 (logs) + 0.52 (stumps)] x 1.2 (average sideslope of 31 – 45%) x 1 (clearing width of 18 – 36') = $3,450/acre. Say $3,500/acre.

Cost = $3,500/acre x 3.25 acres = $11,375.

New clearing = 0.5 miles x 5,280 ft/mi x 25' clearing width / 43,560 sf/acre = 1.52 acres.

Basic cost = $2,300/ac x 1.74 (medium clearing) x [0.67 (tops & limbs) + 0.09 (logs) + 0.52 (stumps)] x 1.2 (average sideslope of 31 – 45%) x 1 (clearing width of 18 – 36') = $6,147/acre. Say $6,150/acre
Cost = $6,150/acre x 1.52 acres = $9,348.

Total cost for clearing = $20,723.

Scarifying, blading and shaping: 2.87 miles – 0.55 miles = 2.32 miles x $1,520/mi = $3,526.

New excavation: Assume 2,500 cy of excavation in 60% common material and 40% rippable rock. Cost per cubic yard = $2.25/cy x 2,500 cy = $5,625.

Drainage dips: Allow for eight new drainage dips per mile.
8/mile x 2.82 miles = 23 drainage dips x $144 each = $3,312.

Geotextile: Place geotextile for 500 feet.
500' x 16' (w) / 9 sf/sy = 888 sy.
888 sy x $0.85/sy = $755.

Widen road from MP 2.80 to MP 3.17:
Volume = 0.37 miles x 5,280ft/mi x 3' (w) x 3' (h) / 27 cf/cy = 650cy x $1.80/cy = $1,170.

Culverts: Four new culverts will be needed. Assume average length of 30'.
4 x 30' x $20/ft = $2,400.

Rock: Place eight (8) inch lift of pit-run or grid-rolled rock on entire road.
Volume = 2.82 miles x 5,280 ft/mi x 14' (w) x 8" (0.67') (d) / 27 cf/cy = 5,173 cy.
Cost at Tidewater pit west of John Day = $4.25/ton. Assume 1.9 tons / cubic yard = 1.9t/cy x $4.25/t = $8.00/cy x 5,173 cy = $41,384.
Haul: Fixed cost = $0.84/cy.
7.4 miles at 40 mph = $0.59/cy/mi x 7.4 mi = $4.37/cy.
3.4 miles at 20 mph = $1.16/cy/mi x 3.4 mi = $3.94/cy.
0.3 miles at 15 mph = $1.55/cy/mi x 0.3 mi = $0.46/cy.
0.3 miles at 10 mph = $2.32/cy/mi x 0.3 mi = $0.70/cy.
1.5 miles at 7 mph = $3.38/cy/mi x 1.5 mi = $5.07/cy.
Total haul = $15.38/cy x 5,173 cy = $79,561.
Mixing and placing:
$2.10/cy x 5,173 cy = $10,863.

Total rock cost = $25.48/cy x 5,173 cy = $131,808

Seed and mulch: Seed and mulch all areas where soil has been disturbed except on the road itself. Assume 5 acres. Cost per acre = $720/acre.
5 acres x $720/ac = $3,600.

Close portion of road being abandoned: Recontour road and seed and mulch.
Estimate 7 days with excavator = 56 hours x $125/hr = $7,000.
Seeding and mulching = 0.55 mi x 5,280 ft/mi x 25' (w) / 43,560 sf/ac = 1.67 ac x $720/ac = $1,202.40. Multiply by 1.5 to allow for heavier than usual seeding and mulching = 1.5 x $1,202.40 = $1,803.60. Say $1,800.
Construct 2 tank traps at $175/trap = $350.
Total cost for closing portion of road = $9,150.

Total cost of Alternative D = $183,514 or $65,076/mile.

Alternative E: Leave road where it is and provide for additional drainage and support. All unit costs will remain the same as Alternative D.

Relocating road away from house will remain the same = $9,680.

Clearing: There will be minimal clearing required. Estimate 4 acres of light clearing with a cost of $3,500/acre. Total cost = $3,500/acre x 4 acres = $14,000.

Scarifying blading and shaping: The entire road from MP 0.3 to MP 3.17 will need to be scarified, bladed and shaped.
Basic cost for scarifying, blading and shaping roadbed = $1,520/mile x 2.87 miles = $4,362.

Drainage dips: Allow for eight (8) new drainage dips per mile.
8/mile x 2.87 miles = 23 drainage dips x $144 each = $3,312.

Widen road costs will remain the same = $1,170.

Rock: Unit cost of $25.48/cy will remain the same.
Volume = 2.87 miles x 5,280 ft/mi x 14' (w) x 8" (0.67')(d) / 27 cf/cy = 5,265 cy.

Total rock cost = $25.48/cy x 5,265 cy = $134,152.

Seed and mulch: Seed and mulch all areas where soil has been disturbed except on the road itself. Assume 4 acres. Cost per acre = $720/acre.
4 acres x $720/ac = $2,880.

Total cost of Alternative E = $169,556 or $59,079/mile.

There are several options for obtaining rock that have not been addressed in the above cost estimate. These options may or may not lower the estimated cost. These options include: 1) Obtain rock from the Holliday Pit on US Highway 26 at approximately MP 169. This should lower the unit cost due to decreased haul distance but the cost of the rock is unknown. There would probably be a royalty fee charged plus the cost of producing the desired material. This may not be possible due to the fact that this is mostly river bottom type rock that would not have the angularity that is needed to hold the surfacing together.
2) Obtain a permit from the Malheur National Forest to remove rock from either the Star Ridge Pit, which is near MP 17 on US Highway 395 south of John Day, or the Four Corners pit which is near the intersection of County Road 18 and Forest Road 36 northeast of John Day. The use of either of these pits would increase the haul cost because they are further from the project than the Tidewater Pit. The removal of material from either of these pits would require an agreement between the BLM and the Malheur National Forest.
3) There is a private pit on County Road 54. The owner of this pit could be contacted and arrangements made for use of that material. The haul from this pit would be almost as far as from the Tidewater Pit.
4) Use material from the Iron King Mine which is located on Forest Service land in Section 18. This will require an agreement with the owner of the mine. It is not known at this time whether the owner would charge a royalty for this material or not so that cost is not included.

Rock costs for material from Iron King Mine:

Production:

Ripping = $0.56/cy
Screening = $2.13/cy
Stockpiling = $1.18/cy
Load from stockpile = $0.75/cy
Total production cost = $4.62/cy

Haul: Fixed cost = $0.84/cy
0.75 miles at 5 mph = $4.64/cy/mi x 0.75 mi = $3.48/cy.
0.29 miles at 5 mph = $4.64/cy/mi x 0.29 mi = $1.35/cy.
1.12 miles at 5 mph = $4.64/cy/mi x 1.12 mi = $5.20/cy for Alternative D.
1.14 miles at 5 mph = $4.64/cy/mi x 1.14 mi = $5.29/cy for Alternative E.

Mixing and placing:

$2.10/cy

Total rock cost:

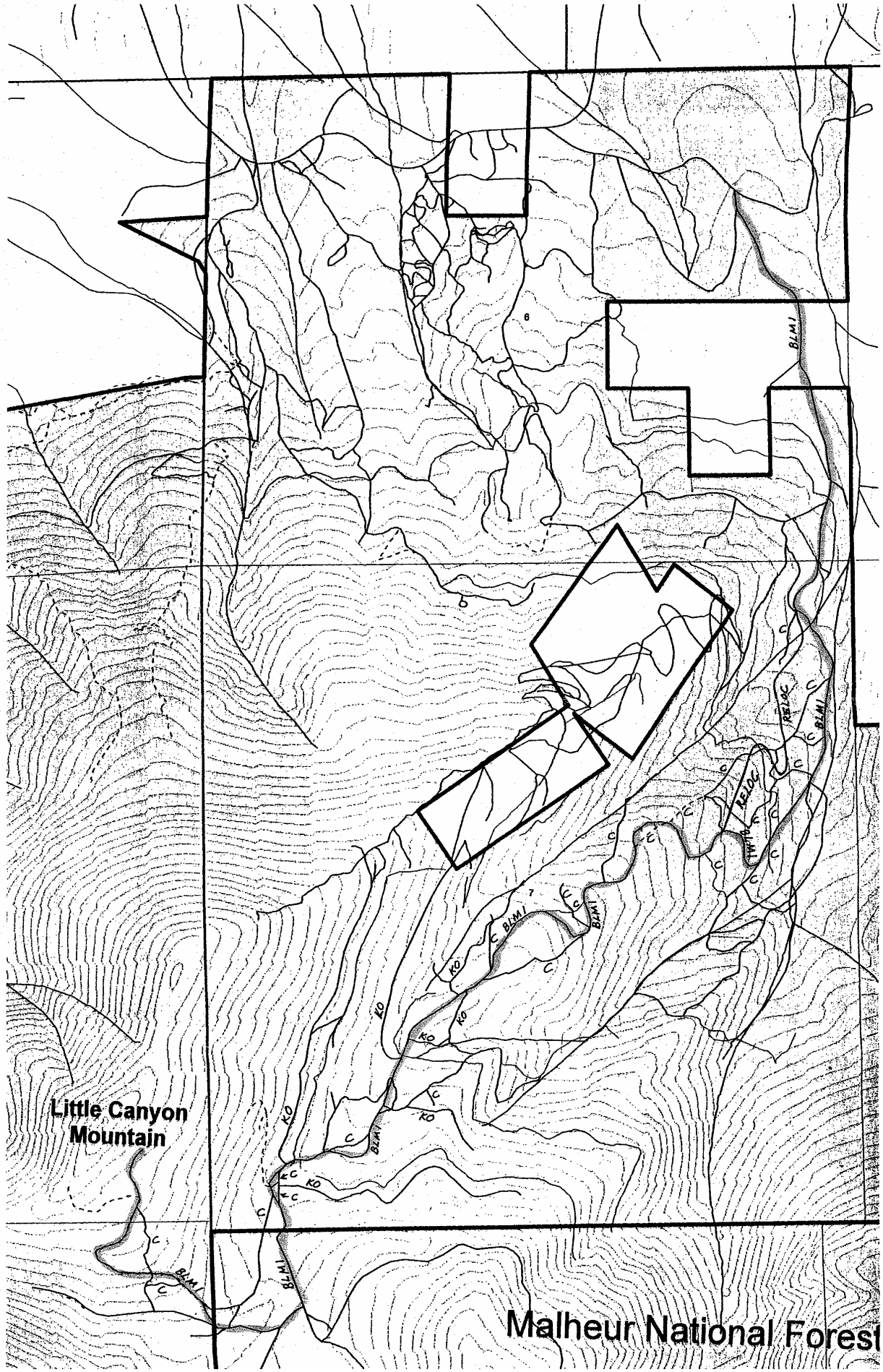
Alternative D = $17.59/cy x 5,173 cy = $90,993.
Alternative E = $17.68/cy x 5,265 cy = $93,085.

Total road costs based on obtaining material from Iron King Mine:

Alternative D: $142,699 or $50,602/mile.
Alternative E: $128,489 or $44,770/mile.

References:

USDA – Forest Service, 2002, Region 6 Cost Estimating Guide for Road Construction, Cost Guide Zone 3, Davis-Bacon Area 6, U.S. Department of Agriculture, Region 6, Portland, OR., Pages 29-36, 46-51, 60-65, 77-78


Little Canyon
Mountain
Malheur National Forest
BLM1
KO
C
RELOC

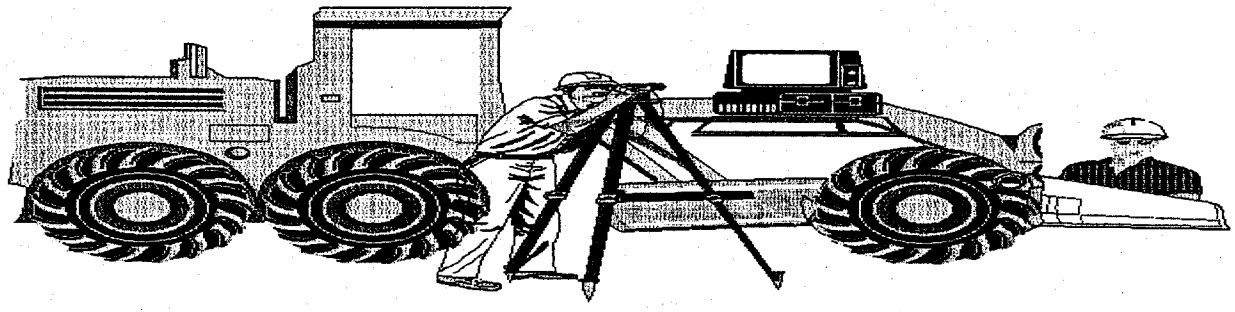
USDA FOREST SERVICE
REGION 6

COST ESTIMATING GUIDE FOR ROAD CONSTRUCTION

COST GUIDE ZONE 3
DAVIS-BACON AREA 6

MALHEUR NATIONAL FOREST
OCHOCO NATIONAL FOREST
UMATILLA NATIONAL FOREST
WALLOWA-WHITMAN NATIONAL FOREST

METRIC



Zone Committee: - Ochoco N.F.
- Umatilla N.F.
- Wallowa-Whitman N.F. -

Effective Date: February 2002
(Must be used on all projects advertised after August 1, 2000)

Rev: 3/16/00

SECTION 201 - CLEARING & GRUBBING

LABOR RANGE: (%)	LOW PERCENT	HIGH PERCENT
40 - 55	Small timber, light ground cover, gentle terrain, good soils, and scattering.	Large timber, heavy ground cover, difficult terrain, poor soils, pile and burn.

Rounding:	***Unit***	***Nearest Unit***
	Kilometers	***0.01***
	Hectares	***0.01***
	Lump Sum	***1***
	Each	***1***

I. Clearing, Grubbing, & Disposal

Basic Cost = $ 5,667 /ha

Multiply the basic cost by the following factors:

A. Clearing Classifications:

Brush	0.07
Extra Light	0.48
Light	1.00
Medium	1.74
Heavy	2.61
Extra Heavy	3.24

B. Slash Treatment Methods: Total disposal factor is the sum of the T&L, Logs, & Stumps factors.

	Treatment	T&L	Logs	Stumps
(1)	Windrowing	0.57	0.06	0.44
(2)	Windrowing large material	0.00	0.06	0.44
(3)	Windrowing and covering	0.60	0.07	0.47
(4)	Scattering	0.53	0.06	0.41
(5)	Burying	0.60	0.07	0.47
(6)	Chipping	0.71	0.26	n/a
(7)	Piling and burning	0.67	0.09	0.52
(8)	Decking unmerch. mat'l	n/a	0.03	n/a
(9)	Disp. in cutting units	T&E	T&E	T&E
(10)	Removal	T&E	T&E	T&E
(11)	Piling	0.55	0.06	0.42
(12)	Placing slash emb. slopes	0.59	0.07	0.46
(13)	Cull logs and stumps	T&E	T&E	T&E
	Sidecasting	0.52	0.06	0.40

C. Average Sideslopes:

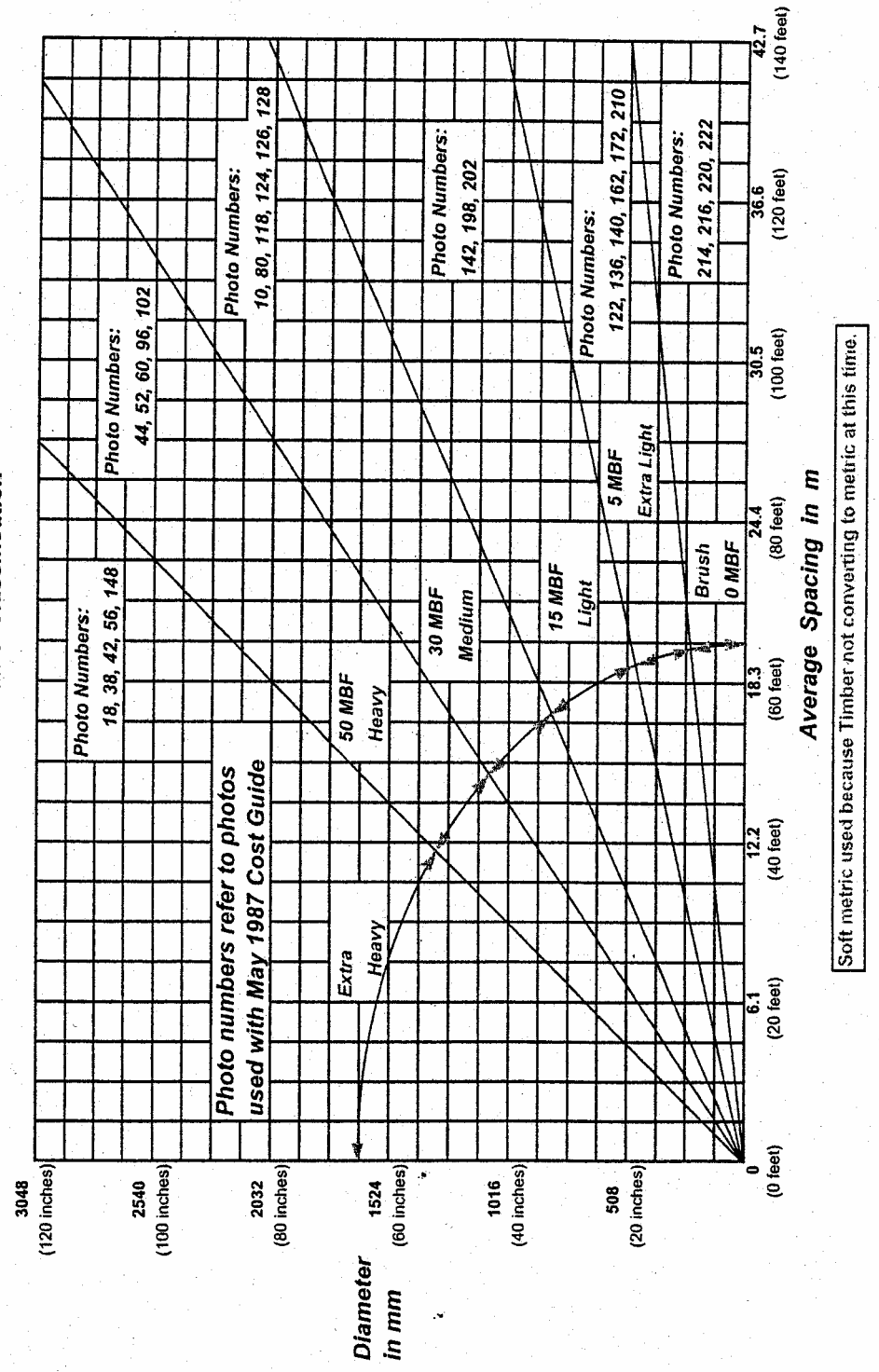
1 - 15%	1.0
16 - 30%	1.1
31 - 45%	1.2
46+%	1.3

D. Average Clearing Width:

< 6 m	1.15
6 - 12 m	1.0
> 12 m	0.9

SECTION 201 - (Continued)

Exhibit 1



II. Individual removal of trees and stumps

Individual trees outside the clearing limits must be costed individually and added to clearing costs if incidental to clearing or listed as separate pay item(s). Costs for trees outside the clearing limits are not included in the basic clearing costs.

A. **Trees ($/each)** These costs are valid when work is being done in conjunction with clearing only. Use time and equipment for other

		DBH		
		6-24" Small 150-600 mm	24-40" Medium 600-1025 mm	>40" Large Over 1025 mm
Fall and Leave	1/	$16.46	$27.43	$43.89
Fall and Remove	2/	$45.87	$86.25	$122.31

1/ Costs are based upon leaving the log(s) and lopping and scattering the tops and limbs.

2/ Costs are based upon removing the logs(s) and scattering the tops and limbs.

When this activity is to take place along an existing road which is open to traffic, add the cost of two flagpersons.

III. Stumps ($/Each) - Note: Cost by using time and equipment.

IV. Move-In

1. Include in Section 601 - Mobilization.
2. Fire Protection costs included in Section 601 - Mobilization.

V. Example -

Assume a road with 3.8ha of Clearing Area with: 35% average Side Slopes, Medium Clearing Classification, 10m Average Clearing Width and Slash Treatment Methods of Pile and Burn Tops and Limbs and Stumps and Deck Unmerchantable Material. The Clearing Costs would be calculated as:

3.8ha ($5667/ha Basic Cost)(1.74 Clearing Class Fac)(0.67 T&L + 0.03 Logs + 0.52 Stumps Slash Treat. Meth.)(1.2 Av. Side Slope Factor)(1.0 Av. Clr. Wid. Fact.) = **$54856**

SECTION 203 - Excavation, Embankment, and Haul

LABOR RANGE: (%)	LOW PERCENT	HIGH PERCENT
34 - 44	Gentle Terrain, Easy Construction, Wide Tolerance, Sidecast, No boulders	Steep and Rocky Terrain, Difficult Construction, Close Tolerances, End Haul, Large Number of Boulders

Rounding:	***Unit***	***Nearest Unit***
	Cubic Meter	***1***
	Kilometer	***0.01***
	Lump Sum	***1***
	Ton	***0.1***
	Square Meter	***0.1***
	Meter	***1***
	Each	***1***
	Cubic Meter Kilometer	***1***

I. Base Excavation Costs: Costs include an average tractor push of less than 30 m, sidecasting, and based upon 249 type finish. Costs for 0-15% sideslopes are also based upon a maximum of 623 m^3 per kilometer. On slopes 0-15% when excavation exceeds 623 m^3 per kilometer, use the $/$m^3$ costs for slopes designated 16-30%. If the use of an excavator is anticipated cost using Time and Equipment.

	CLASSIFICATION	% SIDESLOPE	BASE COST	
A.	Common (soil and loose rock that can be incorporated into the fill)	0 - 15	$ 988.22	$/km
		16 - 30	$ 1.59	$/$m^3$
		Over 40	$ 2.34	$/$m^3$
B.	Boulders (rocks greater than 0.6 meters in diameter)	0 - 15	$ 1,583.84	$/km
		16 - 30	$ 2.45	$/$m^3$
		Over 40	$ 2.95	$/$m^3$
C.	Loose Rock (talus material less than 0.6 meters in diameter with minor amounts of soil)	0 - 15	$ 988.22	$/km
		16 - 30	$ 1.77	$/$m^3$
		Over 40	$ 2.66	$/$m^3$
D.	Rippable Rock (by cat blade and/or ripper tooth)	0 - 15	$ 2,903.71	$/km
		16 - 30	$ 3.17	$/$m^3$
		Over 40	$ 5.16	$/$m^3$
E.	Solid Rock	0 - 15	$ 5,208.70	$/km
		16 - 30	$ 3.98	$/$m^3$
		Over 40	$ 6.24	$/$m^3$

NOTE: For slopes between 31% and 40%, use costs for slopes over 40% if an excavator will probably be used; otherwise use the costs for 16-30% sideslopes.

SECTION 203 - (Continued)

II. Base Add On Costs:

A.

	Compaction Embankment Placing Method	Common $/m³	Rocky $/m³
1.	Sidecasting and end dumping	$0.00	$ -
2.	Layer placement	$ 0.27	$ 0.26
3.	Layer placement (roller comp.)	$ 0.68	$ 0.64
4.	Controlled compaction	$ 0.97	$ 0.68
5.	Controlled compaction using density control strips	$ 1.14	$ 0.77
6.	Special project controlled compaction	Use T& E	Use T& E

B. Tolerance - Add the following costs to Section I.

Class	$/m³	Class	$/m³
A	Use T & E	D	$ 0.09
B	Use T & E	E	$ 0.07
C	$ 0.23	249	$ -

C. Haul

I. Tractor/Scraper - Method A

Method A		Avg. Distance	$/m³-km	$/m³
1.	Tractor and push blade	0 - 30m	$0.00	n/a
2.	Tractor and push blade	30 - 153m	$4.16	n/a
3.	Self-propelled scraper	153 - 610m	$4.55	n/a
4.	Self-propelled scraper	610 - 1220m	$3.41	n/a
5.	Self-propelled scraper	1220 - 1525m	$2.65	n/a

Method B (Scraper Haul)

1.	Fixed costs (delay time allowed for the hauling vehicle to load, dump and turnaround).	n/a	$1.69
2.	Variable costs (haul only)	$1.52	n/a

2. TRUCK

A. LOADING (Loading equipment only)	$/m³
1) Excavator	$ 2.44
2) Front End Loader (use with dozer excavation)	$ 1.97

SECTION 203 - (Continued)

C. Haul (Continued)

2. TRUCK - (Continued)

Truck Haul - Loading and placing should be included in appropriate excavation

Fixed Cost (delay time allowed for the hauling vehicle to load, dump, and turnaround).

	m^3		
	Truck Size	(LLL)	$/m^3$
1.	9.2	7.7	$1.15
2.	15.3	13.8	$1.08

Variable Costs ($/m³ - km). Average haul speed (For both directions).
NOTE: Costs are based upon loaded haul distance and include cost of return trip.

	Truck Size	
km/hr	9.2	15.3
8	$4.30	$2.69
16	$2.15	$1.35
24	$1.43	$0.90
32	$1.07	$0.67
40	$0.86	$0.54
48	$0.72	$0.45
56	$0.61	$0.38
64	$0.54	$0.34
72	$0.48	$0.30
80	$0.43	$0.27
88	$0.39	$0.24

D. Slope Rounding $0.59 $/m

(Consider any additional grubbing requirements.)

E. Subgrade Finishing ($/km) - Cost for Specification 249 is included in the basic excavation costs.

	Subgrades Template	Surfaced		Unsurfaced	
		Common	Rocky	Common	Rocky
1.	Single Lane w/o ditch	$381	$593	$451	$650
2.	Single Lane w/ditch	$537	$669	$711	$879
3.	Double Lane w/ditch	$745	$1,051	$953	$1,185
4.	Double Lance w/blue tops	Use T & E	Use T & E	Use T & E	Use T & E

SECTION 203 - (Continued)

F. Grid Roll

		$/km
1.	Single Lane	$204
2.	Double Lane	$323

G. **Special Ditches** (Do not include normal roadside ditches.). Use Time and Equipment.

H. **Berms** - Use Time and Equipment.

I. **Dips** (not designed into the grade)

		$/Each
1.	Drain Dips (Grade Reversal)	$144
2.	Rolling Dips (Outslope)	$72

J. **Subgrade Treatment - Geotextiles** - Allow for material overlap. ($/m^2)

	Condition		Type	Equip	Labor	Material	Total
1.	Separation:		140NL	$ 0.11	$ 0.28	$ 0.61	$ 1.00
2.	Stabilization:	Normal	500X	$ 0.11	$ 0.28	$ 0.71	$ 1.10
		Heavy	700X	$ 0.11	$ 0.28	$ 1.04	$ 1.43
3.	For materials and labor, (securing pins, sewn seams, etc), other than those shown, call local suppliers and cost by Time and Equipment.						

K. **Water:** Refer to Section 207 for costs.

L. **Mobilization:** Include in Section 601

SECTION 203 - (Continued)

III. The following items were not considered in the Unit Cost Section. If any of these items need to be considered, they should be costed by Time and Equipment, or as noted, and added to the costs developed in the Unit Cost Section.

A. **Sliver Cuts** - Allow costs to construct a ramp to the top of cut

B. **Sliver Fills** - Allow costs to construct a ramp to the toe of fill for benching

C. **Unsuitable Excavation** - Excavate, load, haul, place, and stabilize. If aeration of supersaturated soil is required, recognize time needed to road equipment to and from the site until the soil is suitable for use.

D. **Subgrade Treatment** - See above for removal of unsuitable material. Cost for the purchase and shipping of materials to the site, site preparation, placement of material, and backfill.

E. **Traffic Control** - If the contractor must maintain traffic during construction activities, consider: (1) flaggers, (2) pilot car, (3) signs, and (4) maintenance of signs.

F. **Benching** - Use Time and Equipment.

G. **Abnormal Conditions** - Allow appropriate adjustments for anticipated extended construction seasons, weather conditions, soggy ground, etc.

H. **Conservation of Materials** - May consist of suitable excavation, topsoil, or rock. Consider excavation, load, haul, place, and development of storage area. Check to insure that individual costs have not been previously allowed.

I. **Borrow/Waste** - After computing the quantities, allow for: excavation, load, haul, place, stabilization, and development of storage sites. Check to ensure that individual costs have not been previously allowed.

J. **Special Ditches (other than ditchline) and Berms:** Costs may be dependent upon configuration; include any additional clearing needed for ditch section.

SECTION 304 - AGGREGATE BASE OR SURFACE COURSE

LABOR RANGE: (%)	Low Percent	High Percent
27 - 35	Pit Run, Wide Gradation Tolerance	Crushed, Close Gradation Tolerance

Rounding:	Unit	Nearest Unit
	m^3	1
	tons	0.1
	L.S.	1

All unit prices shall be calculated on loose m^3 measure and then adjusted for in-place quantities.
If portions of this item (preproduction or production) are normally subcontracted
add 10% to those costs.

I. Preproduction

A. Drilling and Shooting of Quarries

	Description	$ / m^3
1.	Drilling and shooting (includes stemming top of drill holes). Lowest cost is for material with seismic velocities of 1373 m per second or less. Highest cost is for material with seismic velocities of 3050 m per second or more.	$1.22 to $1.80
2.	Reduction of oversized (when needed).	Use T & E
3.	Wet Holes	Use T & E
4.	Decking (stemming required to separate charges in the same drill hole).	Use T & E

B. Ripping — $ 0.74

C. Feeding

1.	Crushed/Screened: An allowance for one piece of equipment is included in the costs of production. Use T & E for additional costs if more than one piece of equipment is required.	Use T & E
2.	Grid Rolled/Pit Run: Cost, if needed, is for pushing material into a pile for loading into	$ 0.44

D. Blending — Use T & E

SECTION 304 - (Continued)

II. Production

Description	$/m³
A. Crushing	Refer to Exhibits 13 - 15 in Part II

	Gradation	Material Type					
		Cobbles		Rippable		Solid	
		m³/Hr	$/m³	m³/Hr	$/m³	m³/Hr	$/m³
3 Stage Crusher	C	93	$ 3.43	93	$ 5.45	93	$ 6.12
	F	83	$ 3.69	83	$ 5.86	83	$ 6.58
	G	78	$ 3.92	78	$ 6.24	78	$ 7.01
	S	86	$ 3.71	86	$ 5.89	86	$ 6.62
	T	81	$ 3.94	81	$ 6.26	81	$ 7.03
	U	77	$ 4.14	77	$ 6.58	77	$ 7.40
2 Stage Crusher	A	84	$ 3.80	84	$ 6.03	84	$ 6.78
	B	92	$ 3.47	92	$ 5.51	92	$ 6.19
	D	83	$ 3.84	83	$ 6.11	83	$ 6.86
	E	78	$ 4.09	78	$ 6.50	78	$ 7.30
	H	92	$ 3.33	92	$ 5.29	92	$ 5.94
1 Stage Crusher (Jaw Run)	L	149	$ 1.42	149	$ 2.25	149	$ 2.53
	M	135	$ 1.56	135	$ 2.48	135	$ 2.79
	N	97	$ 2.18	97	$ 3.46	97	$ 3.88
	O	92	$ 2.29	92	$ 3.65	92	$ 4.10
	P	101	$ 2.09	101	$ 3.32	101	$ 3.73
	Q	96	$ 2.20	96	$ 3.49	96	$ 3.93
	R	92	$ 2.29	92	$ 3.65	92	$ 4.10
Cinders	X	58	$ 3.64				
	Y	55	$ 3.83				
	Z	52	$ 4.09				

B.	Scalping	$ 0.28
C.	Pit Run (Loading Only)	$ 0.98
D.	Grid Roll (Loading Only)	$ 0.98
E.	Screened	$ 2.79

III. Stockpiling

If stockpiling is required (for crushed and screened aggregate only) on a new

	Description	$ / m³
A.	Develop Stockpile Area	Use Section 611 or T & E
B.	Haul to Stockpile (Use if >46m from crusher site)	Use IV. Haul or T & E
C.	Stockpile Material	$ 1.55
D.	Load from Stockpile	$ 0.98

IV. Haul

A. Fixed Cost

Delay time allowed for the hauling vehicle to load, dump, and turnaround. Approximate Legal Load Limits (LLL) in cubic meters, are shown after the truck size. Consider location of turnarounds when computing haul distance.

Truck m^3 Size	m^3 LLL	$/m^3
9.2	7.7	$ 1.01
15.3	13.8	$ 1.10
19.1	19.2	$ 0.90

This is a 15.3 m^3 Truck with side boards. Use for Light Materials ONLY such as Cinders

B. Variable Costs

($/$m^3$-km) based upon average truck speed (loaded and empty).
NOTE: Costs are based upon loaded haul distance and include cost of return trip.

km/h	9.2 m^3 Truck $/$m^3$-km	15.3 m^3 Truck $/$m^3$-km	19.1 m^3 Truck $/$m^3$-km
8	$3.80	$2.35	$1.69
11	$2.77	$1.71	$1.23
16	$1.90	$1.18	$0.85
24	$1.27	$0.78	$0.56
32	$0.95	$0.59	$0.42
40	$0.76	$0.47	$0.34
48	$0.63	$0.39	$0.28
56	$0.54	$0.34	$0.24
64	$0.48	$0.29	$0.21
72	$0.42	$0.26	$0.19
80	$0.38	$0.24	$0.17
89	$0.34	$0.21	$0.15

NOTE: Consider location of turnarounds when computing haul distance.

V. Processing

A. Compaction

Method	$/m^3
A	$ -
B	$ 1.15
C	$ 1.20
D	$ 1.49
E	$ 0.94

Grid Rolled compaction costs are included in B., below.

B. Mixing & Placing (includes stakehop)

Description	$/m^3
Crushed	$ 1.10
Pit Run	$ 1.10
Grid Rolled	$ 2.76

← Includes Grid Rolling and Compaction Method E

C. Water Refer to Section 207.

VI. Miscellaneous

A. Aggregate Testing

1. Fixed Cost

total m^3 for each gradation.

Total Cost
$ 579.50

2. Variable Cost

See specification for frequency of tests ($/m^3 costs are based upon testing at 536 m^3 intervals).

Test	$/m^3	$/Each
T-11	$ 0.120	$ 64.35
T-27	$ 0.098	$ 52.65
T-89	$ 0.131	$ 70.20
T-90	$ 0.131	$ 70.20
T-176	$ 0.096	$ 51.48

B. Permits & Royalties (Cost on an individual basis)

C. Traffic Control - Use Time and Equipment

D. Weighing Aggregate - Use Time and Equipment

E. For State of Washington Only

Add use tax to the value of the aggregate up through stockpiling or removal of aggregate from crusher belt. If the aggregate to be placed was stockpiled from a previous contract, the use tax must be allowed at this time. Compute the additional cost as follows:

Crushed Aggregate: $0.29 x volume of aggregate placed (m^3) 1/
m^3) 1/

1/ Example:

$0.29 = 8.0% x $3.63 (Value of crushed aggregate per m^3)

$0.12 = 8.0% x $1.49 (Value of Pit Run/Grid Rolled per m^3)

If pay unit is metric tons, it is necessary to convert metric tons to m^3 for the formula. Add these costs to your estimate.

* * * DO NOT reduce for Specified Road Costs * * *

VII. Haul Road Maintenance

VIII. Move-In

Include in Section 601 Mobilization

IX. Pit Development

(Access roads may be considered as a specified road, or the costs may be made incidental to Section 611. Consider the type and amount of work to be performed.)

SECTION 306 - RECONDITIONING EXISTING ROAD

LABOR RANGE: 55%

Rounding:	*Unit*	*Nearest Unit*
	Kilometer	*0.1*
	Lump Sum	*1*
	Each	*1*

I. Reshape

Road Width	Blading		Scarify $/km
	With Ditch $/km	w/o Ditch $/km	
A. Single Lane (includes turnouts)	$ 430	$ 264	$ 514
B. Double Lane	$ 592	$ 389	$ 777

II. Compaction Method

Comp Method	Single Lane $/km	Double Lane $/km
A	$ -	$ -
B	$ 214	$ 386
C	$ 250	$ 447
D	$ 286	$ 518
GR	$ 201	$ 302

Grid Rolling costs include a towed vibratory roller- if use of a non-vibratory is anticipated change costs accordingly.

III. Water

Refer to Section 207.

IV. Items not considered in above costs

A. Pulverizing bituminous and dust oiled surfaces.

B. Blading travelway and shoulders of intersecting roads.

C. Cleaning culverts inlets and outlets. (If the culvert barrel needs to be cleaned, use Section 618.)

D. Removal of slides and excess material resulting from drainage structure cleanout including the preparation of storage area, load, haul, place, and stabilization.

E. Blading parking areas.

F. Removal of oversize after scarification, including load, haul, and disposal.

G. Include roadside brushing in Section 201.

H. Clean Catch Basins.

V. Mobilization

Include in Section 601.

SECTION 603 - METAL PIPE

LABOR RANGE: (%)	Low Percent 450mm - 800mm dia Culverts	High Percent 900mm - 2400mm dia Culverts
34 - 39		

Rounding:	*Unit*	*Nearest Unit*
	m	*0.1*
	Each	*1*

I. General Notes

A. The material prices shown are for quantity purchases (over 6800 kg) of galvanized steel. For quantities between 2300 and 6800 kg, add 10 percent. For quantities under 2300 kg, add 20 percent.

B. Material costs include the cost of bands and delivery to the job site. Material costs do not include factory elongation, strutting, or other special additional costs.

C. Installation costs are for average operating and ground conditions. If backfill or bedding must be imported, pipes are widely scattered, unsuitable material (swampy or rocky) must be removed, etc., additional installation costs should be allowed. Installation costs include the cost of moving pipes from the delivery point to the installation sites.

D. For pipe sizes denoted with an *, consider a material cost increase for 5 percent factory elongation.

E. Aluminum costs are not included in this guide, as Aluminum costs are normally equal to, or greater than galvanized steel. When aluminum is needed, call suppliers for quotes.

F. Material and installation costs for corrugated polyethylene pipe are included in Section 603B - Corrugated Polyethylene Pipe.

G. Installation costs are based upon Compaction Method B and C. When using other methods, if necessary, adjust the cost on an individual basis. Method A is 80% of Method B and C.

H. If material must be imported and/or exported, a source should be identified.

I. If use of an excavator is anticipated cost installation Time and Equipment for culverts under 900mm in diameter.

II. Material and Installation Costs

A. Round Pipe 68 x 13 mm Corrugations

	Thickness Steel - Alum mm	Dia mm	Gauge	Galvanized Uncoated				Galvanized Coated			
				Material $/m	Install $/m	Total $/m	Wt kg/m	Material $/m	Install $/m	Total $/m	Wt kg/m
	1.63 / 1.52	450	16	$28.27	$31.01	$59.28	22.0	$ 36.17	$31.01	$67.18	27.0
	1.63 / 1.52	500	16	$30.84	$31.01	$61.85	24.0	$ 38.74	$31.01	$69.75	29.0
	1.63 / 1.52	600	16	$37.27	$31.01	$68.28	29.0	$ 48.33	$31.01	$79.34	36.0
	1.63 / 1.52	800	16	$50.12	$34.11	$84.23	39.0	$ 64.34	$34.11	$98.45	48.0
	1.63 / 1.52	900	16	$56.55	$46.64	$103.19	44.0	$ 72.35	$46.64	$118.99	54.0
	1.63 / 1.52	1000	16	$62.97	$55.32	$118.29	49.0	$ 80.35	$55.32	$135.67	60.0
*	1.63 / 1.52	1200	16	$75.83	$68.66	$144.49	59.0	$ 96.37	$68.66	$165.03	72.0
	2.01 / 1.91	450	14	$34.70	$31.01	$65.71	27.0	$ 44.18	$31.01	$75.19	33.0
	2.01 / 1.91	500	14	$39.84	$31.01	$70.85	31.0	$ 50.90	$31.01	$81.91	38.0
	2.01 / 1.91	600	14	$47.55	$31.01	$78.56	37.0	$ 60.19	$31.01	$91.20	45.0
	2.01 / 1.91	800	14	$62.97	$34.11	$97.08	49.0	$ 80.35	$34.11	$114.46	60.0
	2.01 / 1.91	900	14	$70.69	$46.64	$117.33	55.0	$ 89.65	$46.64	$136.29	67.0
	2.01 / 1.91	1000	14	$78.40	$55.32	$133.72	61.0	$ 100.52	$55.32	$155.84	75.0
*	2.01 / 1.91	1200	14	$93.82	$68.66	$162.48	73.0	$ 119.10	$68.66	$187.76	89.0
*	2.01 / 1.91	1400	14	$109.24	$79.95	$189.19	85.0	$ 139.26	$79.95	$219.21	104.0
*	2.01 / 1.91	1500	14	$118.24	$89.32	$207.56	92.0	$ 151.42	$89.32	$240.74	113.0
	2.77 / 2.67	600	12	$62.97	$31.01	$93.98	49.0	$ 80.35	$31.01	$111.36	60.0
	2.77 / 2.67	800	12	$84.82	$34.11	$118.93	66.0	$ 108.52	$34.11	$142.63	81.0
	2.77 / 2.67	900	12	$95.10	$46.64	$141.74	74.0	$ 121.96	$46.64	$168.60	91.0
	2.77 / 2.67	1000	12	$105.39	$55.32	$160.71	82.0	$ 133.83	$55.32	$189.15	100.0
*	2.77 / 2.67	1200	12	$127.23	$68.66	$195.89	99.0	$ 161.99	$68.66	$230.65	121.0
*	2.77 / 2.67	1400	12	$147.80	$79.95	$227.75	115.0	$ 188.88	$79.95	$268.83	141.0
*	2.77 / 2.67	1500	12	$159.36	$89.32	$248.68	124.0	$ 203.60	$89.32	$292.92	152.0
*	2.77 / 2.67	1700	12	$179.93	$100.94	$280.87	140.0	$ 230.49	$100.94	$331.43	172.0
*	2.77 / 2.67	1800	12	$190.21	$110.41	$300.62	148.0	$ 242.35	$110.41	$352.76	181.0

* For pipe sizes denoted with an *, consider a material cost increase for 5 percent factory elongation.

II. Material and Installation Costs - (Continued)

B. Round Pipe 75 x 25mm Corrugations

	Thickness Steel - Alum mm	Dia mm	Gauge	Galvanized Uncoated				Galvanized Coated			
				Material $/m	Install $/m	Total $/m	Wt kg/m	Material $/m	Install $/m	Total $/m	Wt kg/m
*	2.01 / 1.91	0	14	$101.17	$68.66	$173.26	82.0	$ 128.47	$68.66	$200.56	100.0
*	2.01 / 1.91	0	14	$118.44	$79.95	$202.39	96.0	$ 151.81	$79.95	$235.76	118.0
*	2.01 / 1.91	0	14	$127.08	$89.32	$220.87	103.0	$ 161.97	$89.32	$255.76	126.0
*	2.01 / 1.91	0	14	$143.12	$100.94	$249.11	116.0	$ 182.56	$100.94	$288.55	142.0
*	2.01 / 1.91	0	14	$151.76	$110.41	$267.69	123.0	$ 194.23	$110.41	$310.16	151.0
*	2.01 / 1.91	0	14	$169.03	$123.98	$299.21	137.0	$ 216.05	$123.98	$346.23	168.0
*	2.01 / 1.91	0	14	$185.07	$140.86	$332.97	150.0	$ 236.64	$140.86	$384.54	184.0
*	2.01 / 1.91	0	14	$193.71	$158.26	$359.88	157.0	$ 246.80	$158.26	$412.97	192.0
*	2.01 / 1.91	0	14	$202.34	$178.97	$390.26	164.0	$ 258.46	$178.97	$446.38	201.0
*	2.77 / 2.67	0	12	$138.18	$68.66	$210.27	112.0	$ 176.10	$68.66	$248.19	137.0
*	2.77 / 2.67	0	12	$161.63	$79.95	$245.58	131.0	$ 205.62	$79.95	$289.57	160.0
*	2.77 / 2.67	0	12	$172.73	$89.32	$266.52	140.0	$ 221.27	$89.32	$315.06	172.0
*	2.77 / 2.67	0	12	$196.17	$100.94	$302.16	159.0	$ 250.77	$100.94	$356.76	195.0
*	2.77 / 2.67	0	12	$207.28	$110.41	$323.21	168.0	$ 264.92	$110.41	$380.85	206.0
*	2.77 / 2.67	0	12	$230.72	$123.98	$360.90	187.0	$ 294.43	$123.98	$424.61	229.0
*	2.77 / 2.67	0	12	$252.93	$140.86	$400.83	205.0	$ 322.70	$140.86	$470.60	251.0
*	2.77 / 2.67	0	12	$265.27	$158.26	$431.44	215.0	$ 338.08	$158.26	$504.25	263.0
*	2.77 / 2.67	0	12	$276.37	$178.97	$464.29	224.0	$ 352.21	$178.97	$540.13	274.0

* For pipe sizes denoted with an *, consider a material cost increase for 5 percent factory elongation.

Material and Installation Costs

A. Pipe Arch 68 x 13mm Corrugations

Thickness Steel - Alum mm	Pipe Arch Span/Rise/Dia mm				Gauge	Galvanized Uncoated Material $/m	Galvanized Uncoated Install $/m	Galvanized Uncoated Total $/m	Galvanized Uncoated Wt kg/m	Galvanized Coated Material $/m	Galvanized Coated Install $/m	Galvanized Coated Total $/m	Galvanized Coated Wt kg/m
1.63 / 1.52	510	x	380	450	16	$ 30.37	$ 44.24	$ 74.61	22.0	$ 38.27	$ 44.24	$ 82.51	27.0
1.63 / 1.52	560	x	420	500	16	$ 33.13	$ 49.40	$ 82.53	24.0	$ 41.03	$ 49.40	$ 90.43	29.0
1.63 / 1.52	680	x	500	600	16	$ 40.03	$ 55.05	$ 95.08	29.0	$ 51.09	$ 55.05	$106.14	36.0
1.63 / 1.52	910	x	660	800	16	$ 53.84	$ 68.94	$122.78	39.0	$ 68.06	$ 68.94	$137.00	48.0
1.63 / 1.52	1030	x	740	900	16	$ 60.74	$ 82.72	$143.46	44.0	$ 76.54	$ 82.72	$159.26	54.0
2.01 / 1.91	510	x	380	450	14	$ 37.27	$ 44.24	$ 81.51	27.0	$ 46.75	$ 44.24	$ 90.99	33.0
2.01 / 1.91	560	x	420	500	14	$ 42.79	$ 49.40	$ 92.19	31.0	$ 53.85	$ 49.40	$103.25	38.0
2.01 / 1.91	680	x	500	600	14	$ 51.08	$ 55.05	$106.13	37.0	$ 63.72	$ 55.05	$118.77	45.0
2.01 / 1.91	910	x	660	800	14	$ 67.64	$ 68.94	$136.58	49.0	$ 85.02	$ 68.94	$153.96	60.0
2.01 / 1.91	1030	x	740	900	14	$ 75.92	$ 82.72	$158.64	55.0	$ 94.88	$ 82.72	$177.60	67.0
2.01 / 1.91	1150	x	820	1000	14	$ 84.21	$ 99.19	$183.40	61.0	$106.33	$ 99.19	$205.52	75.0
2.77 / 2.67	680	x	500	600	12	$ 67.64	$ 55.05	$122.69	49.0	$ 85.02	$ 55.05	$140.07	60.0
2.77 / 2.67	910	x	660	800	12	$ 91.11	$ 68.94	$160.05	66.0	$114.81	$ 68.94	$183.75	81.0
2.77 / 2.67	1030	x	740	900	12	$102.15	$ 82.72	$184.87	74.0	$129.01	$ 82.72	$211.73	91.0
2.77 / 2.67	1150	x	820	1000	12	$113.20	$ 99.19	$212.39	82.0	$141.64	$ 99.19	$240.83	100.0
2.77 / 2.67	1390	x	970	1200	12	$136.66	$130.53	$267.19	99.0	$171.42	$130.53	$301.95	121.0
2.77 / 2.67	1630	x	1120	1400	12	$158.75	$157.32	$316.07	115.0	$199.83	$157.32	$357.15	141.0

SECTION 603 - (Continued)

III. Culvert Pipe End Treatment

Add the cost of any length of pipe that is lost due to the cuts for both field and factory cuts.

Notes:

Call Suppliers for quotes or use the following table (costs are in $/End Treated).

For Pipe Arches find the cost for the equivalent size and add 10%.

Field Cuts

Pipe Diameter mm	Beveled or Skewed	Skewed Bevel
450	$62.03	$83.12
500	$66.83	$89.55
600	$76.23	$102.15
800	$94.19	$126.21
900	$103.59	$138.81
1000	$123.75	$ 169.54
1200	$148.50	$ 203.45
1400	$173.25	$ 237.35
1500	$185.63	$ 254.31
1700	$210.38	$ 288.21
1800	$222.75	$ 305.17

Factory Cuts

Pipe Dia mm	Beveled or Skewed	Skewed Bevel
450	$33.75	$67.50
500	$37.50	$75.00
600	$45.00	$90.00
800	$60.00	$120.00
900	$67.50	$135.00
1000	$75.00	$150.00
1200	$90.00	$180.00
1400	$105.00	$210.00
1500	$112.50	$225.00
1700	$127.50	$255.00
1800	$135.00	$270.00

IV. Culvert Pipe Special Items

A. Extra Culvert Bands (Add on Cost)

Band Width mm	Cost of Band	
178	0.46m	of equivalent size pipe
305	0.61m	of equivalent size pipe
610	0.92m	of equivalent size pipe

Pipe Costs allow for one 305mm Band per 6.1m of Pipe.

IV. Culvert Pipe Special Items (Continued)

For sizes other than those shown, contact local suppliers.

B. Elbows - Hinged - **Includes hardware as well as cutting.**
Material cost is included with cross drain and downpipe length of pipe.

Pipe Diameter mm	Field Cut $/Each	Factory Cut $/Each
450	$ 112.21	$ 30.60
600	$ 142.81	$ 40.80
800	$ 173.41	

C. Full Round Elbows, Tees, and Wyes - **Material cost only**
If not considered incidental to pipe installation then cost using Time & Equipment.

Dia Size	Elbows	Tees	Wyes
450mm	$ 113.63	$ 180.63	$ 156.00
600mm	$ 152.38	$ 175.41	$ 198.04

D. Flared Inlets

Pipe Diameter mm	Material $/Each	Install $/Each	Total $/Each
450mm	$ 115.84	$30.67	146.51
600mm	$ 171.66	$38.33	209.99

V. 5% Elongation

Cost of $ 0.0100 /mm of Diameter, per m length of pipe. From supplier at time of update.

VI. Shoring

Includes both sides. Add to the following material costs, the cost of fabrication and installation. Calculate material costs as the length of shoring times the depth of the shoring.

Depth of Shoring	Add'l $/m
4.6m and Under	Time & Equipment
Over 4.6m	Time & Equipment

VII. If unsuitable material will be encountered (for bedding, backfilling, etc.), add the additional costs to remove and replace that material. A borrow source and/or disposal site should be identified.

SECTION 625 - SEEDING & MULCHING

LABOR RANGE: (%)	Low Percent	High Percent
35 - 50	Hydro-Mulch Flat Slopes, Large Projects.	Hand-Placed Mulch Steep Slopes, Small Projects.

Rounding:	*Unit*	*Nearest Unit*
	Lump Sum	*1*
	Hectares	*0.1*

I. Seed

Unit 3/

Type of Seed	$/kg
Average Mix 1/	$ 3.33

II. Fertilizer

Type of Fertilizer	$/t
16-20-0-15	$ 467.50
Lime Neutralizer	$ 275.00

III. Mulch Includes Haul to Project Site within 121 km radius.

Type of Mulch	$/t
Straw	$262
Hay	$150
Wood Cellulose Fiber	$612
Grass Cellulose Fiber	$576
Paper	$523

IV. Tackifier 1/

Type of Tackifier	$/t
Terratack II or III	Contact Supplier for Costs
CSS-1	See Section 400 - Bituminous Materials

V. Total Application Costs 4/

Type of Mulch	$/ha
Dry Method (without mulch)	$783
Dry Method (with mulch)	$1,309
Hydraulic Method (without mulch) 5/	$1,513
Hydraulic Method (with mulch) 5/	$2,253
CSS-1 2/	T & E
Terratack 2/	T & E

VI. Small Hectare Adjustment

Applies to hydraulic method and dry method with mulch.

For projects with less than 4 hectares, adjust the costs by multiplying the total price by the factor: 1 + (0.60 x (4 - number of hectares in the project) / 4.

Example - using 2.4 total project hectares

Factor = 1 + (0.60 x (4 - 2.4) / 4)
Factor = 1 + (0.60 x (1.6) / 4)
Factor = 1 + (0.24)
Factor = 1.24

Footnotes

1/ Because of Forest Supplements, County restrictions, etc., check to make sure the right seed mixture is being proposed for the project/sale. Then call local suppliers for exact costs. Cost shown is for an average generic grass seed mixture.

2/ Will normally be used only when Dry Method (with mulch) is designated. Rate of application for Terratack II or Terratack III is recommended at 28 liters per hectare. Rate of application for CSS-1 is 467 liters per hectare.
827 liters = 1 Ton.

3/ Refer to individual Forest Supplements.

4/ All methods assume that 44kg of seed and 225kg of fertilizer will be applied per hectare. Dry Method (with mulch) assumes 4480kg of grass hay per hectare. Hydraulic Method (with mulch) assumes 1680kg of wood cellulose fiber per hectare. Material costs need to be added separately and do not include haul to project.

5/ For Hydromulch, the costs shown are for water sources within 8km. If the water source is greater than 8km, consider adding extra cost for water haul.